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PILOT RECRUITMENT OF AFRICAN-AMERICANS:
AN EXAMINATION OF A NEGATIVE TREND

by

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A Research Report Submitted to the Faculty

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Preface

In August of 1999, the Commander of the Southeast Region, HQ AFROTC, asked Air Command and Staff to offer the topic of African-American pilot recruitment to the student body. I volunteered to research the subject based on my interest, which stems from my experiences as an instructor pilot.

I would like to acknowledge the assistance of the faculty members of Air Command and Staff who guided me, particularly Lt Col Marshall Cobb and Lt Col Hank Dasinger. Additionally, I would like to thank the staff at Headquarters AFROTC, especially Colonel Richard E. Butler, Commander of the Southeast Region, for initiating this project and assisting with it. Further, I applaud the effort put forth by those Detachment Commanders who answered the survey and demonstrated such great interest and enthusiasm for this project. Finally, I have truly valued the counsel and support of my African-American classmates at Air Command and Staff. Their insights contributed a great deal to my understanding of this topic.

Abstract

During 1997-1999, the percentage of African-American AFROTC students selected for rated positions was significantly below what would be expected based on the percentage of African-Americans enrolled in ROTC. Diversity in the USAF is highly valued and mandated by law and USAF senior leadership. During the course of this study, historical data were analyzed to identify trends relating to African-American enrollment in ROTC and their subsequent selection for Undergraduate Pilot Training (UPT). The criteria used to select pilot training candidates from eligible AFROTC students were carefully examined to identify factors in the selection process that potentially limit the number of African-Americans eligible for UPT. Specifically, this study focused on assessing how the component weighting of the order of merit score assigned to AFROTC students impacts African-American selection rates. A survey was conducted to examine the consistency of the criteria used by Commanders across AFROTC detachments for determining a student's Unit Commander Ranking (UCR).

The goal of this research is to recommend a standardized framework for utilization by Air Force decision makers. By correcting problems with the selection process, this framework should result in greater diversity, higher overall quality, and a larger pool of prospective candidates with respect to the pilot corps.

Part 1

Introduction

Above all, we know that for the long range we need the most dedicated, most skilled people. We have, and will continue to build, a force of professionals which gives us strength through their diversity. The Air Force is knit from strands of the very fabric of America. We gain knowledge and skill by drawing more deeply on the abilities of Americans of all races, ethnicities, religions, personal talents and family backgrounds.

— Secretary of the Air Force Sheila E. Widnall

Civilian and military leaders of the United States Air Force agree that diversity in our organization is valuable and important.¹ Civil law mandates equal opportunity for all Americans.² In 1949, the Air Force implemented a policy against discrimination based on race, color, religion, or national origin. The Air Force further demonstrated its commitment toward ensuring an environment of fair and equal treatment for all service members by creating the Military Equal Opportunity and Treatment Program in 1971.

If the percentage of African-American Air Force pilots matched the percentage of African-Americans in the national population, there would be approximately 1,611 African-American pilots in the USAF. However, according to 1999 Air Force Personnel Center statistics, only 235 of the current active duty force of 12,583 Air Force pilots were African-American.³ These statistics indicate that there is a lack of diversity in the USAF pilot force, particularly regarding African-Americans.

The ever-increasing strains on Air Force recruiting make it imperative that we continue to attract people from the entire breadth of our society to create a diverse, professional warfighting force. The concept of strength through diversity is directly applicable to the pilot corps. The largest number of pilot candidates comes from the Reserve Officer Training Corps (ROTC). During 1997-1999, the percentage of African-American AFROTC students selected for rated positions was significantly below what would be expected based on the percentage of African-Americans enrolled in ROTC.⁴ In 1999, 33% of the available African-American candidates were chosen; while over 60% of Caucasian candidates were selected for pilot training.⁵ Consequently, HQ ROTC requested ACSC support to identify and analyze the factors influencing the pilot candidate selection process that adversely impact African-American selection rates.

To accomplish this task, ROTC's selection process for UPT, as set forth in AFROTC Instruction 36-2013, will be discussed in detail. Since Unit Commander Rankings (UCR) have the greatest weighted influence on the selection of pilot candidates from AFROTC detachments, it was necessary to identify the specific criterion used by commanders for ranking their students. To accomplish this, a survey was developed and distributed to each of the nearly 150 AFROTC Detachment Commanders. The questions raised by the survey instrument focused on the consistency and weighting of the factors used by AFROTC Commanders and their relative appropriateness as predictors of Undergraduate Pilot Training (UPT) performance. These data were critical in determining how inconsistencies in selection criteria contributed to the relative disproportionate number of African-American pilots in the USAF.

The results of the survey will be reviewed as it pertains to the process used to calculate the Order of Merit score. This study will then focus on the UCR, the major subcomponent of the Order of Merit score, and its impact on final selection outcomes. Finally, this study will assess the impact of the selection process on eligible African-American AFROTC students and recommend changes directed at correcting these negative trends identified by the analysis.

Notes

¹ Fogleman, Ronald R. Chief of Staff, US Air Force. "Tuskegee Airman: Breaking the Myths." Address. Tuskegee Airmen Convention Banquet, Atlanta, 12 August 1995.

² Equal Pay Act of 1963; Title VII of the Civil Rights Act of 1964; the Age Discrimination in Employment Act of 1967; and Section 501 of the Rehabilitation Act of 1973.

³ Air Force Personnel Center, December 30, 1999.

⁴ Throughout this paper, I refer to this segment of the minority population as "African-Americans" to provide consistency in the discussion. During reviews of supporting research where the population designation is more explicit, e.g., non-Hispanic Black, the original label will be used for greater accuracy.

⁵ Headquarters Air Force Reserve Officer Training Corps, Cadet Personnel Section, February 2000.

Part 2

Background

Shallow understanding from people of good will is more frustrating than absolute misunderstanding from people of ill-will.

— Martin Luther King Jr.

Currently, it is estimated that 12.8% of the U.S. population is non-Hispanic Black.¹ 12.6% of American college students are non-Hispanic Black.² According to the Air Force Personnel Center, at the end of 1999, about 6% of USAF officers and 2% of Air Force pilots were non-Hispanic Black.³ In addition, only 1.4% of those selected by ROTC for UPT in 1999 were African-American. Figure 1 graphically illustrates these percentages. The rate of attrition is high as you move from the general population to current USAF. It appears that some barriers inhibit the selection of African-American pilot candidates.

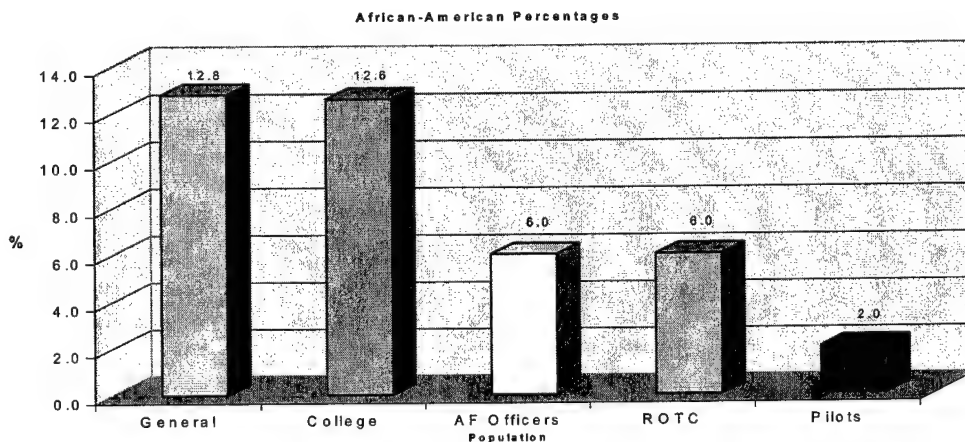


Figure 1. Percentage of African-Americans by Group

Research on the nature of these barriers and possible solutions has been ongoing for over 20 years.⁴ Gene Jackson, an Air University researcher examining the relative paucity of African-American fighter pilots, suggested that AF leaders should be aware of the problem and attempt to bolster the interest of African-American youths in ROTC. He went on to advocate that allocations for pilot training should be increased in Historically Black College ROTC programs.⁵ John Mathews of the Air Force Research Laboratory examined racial equity in Undergraduate Flying Training (UFT). He found that AF Officer Qualification Tests (AFOQT) are poorer predictors of performance in UFT for African-Americans and that the composite pilot test did not demonstrate adequate validity for non-whites.⁶ Delbert Buchanan, investigating African-American attrition at UFT, concluded that AFOQT scores for pilots are more predictive of performance for whites than African-Americans and that technical degrees provided some indication of UFT performance.⁷ Based on his analysis, Buchanan recommended that recruiting for African-Americans seeking technical degrees be improved, selective scholarships be established, and that flying hours for African-Americans in ROTC be increased.⁸ Lastly, in a report commissioned by the Air Force Director of Personnel, General Habinger, the USAF Research Laboratory determined that subgroup selection ratios for minority applicants for pilot training were smaller than that for majority candidates.⁹ In fact, the selection ratio for African-Americans was smaller than that for any other group. The study concluded that the cadet rank order specified by the Categorization Order of Merit (COM) score was a primary reason for the difference in ratios.

According to Dr. Joseph Weeks, in the study commissioned by General Habinger, about 8% of AFROTC cadets are Black.¹⁰ However, Dr. Weeks also pointed out that the

percentage of African-Americans in AFROTC selected for pilot training was about 1.5%. This could be due to the fact that proportionally fewer African-Americans chose to apply for pilot training. Unfortunately, it was beyond the scope of this study to determine how many African-American cadets did or did not apply based on their perceptions of their chances for success versus their motivation to fly military aircraft. However, it is possible, given the resources available, to examine the criteria and process by which pilot candidates are selected.

AFROTC Instruction 36-2013 provides the process by which ROTC pilot candidates are selected, sets forth requirements for candidacy, and assigns scores for various factors.¹¹ If the basic requirements, i.e. minimum Grade Point Average (GPA), passing the Physical Fitness Test (PFT), and minimum scores on specified portions of the Air Force Officer Qualifying Test (AFOQT) are met, the candidate may be nominated for pilot training. The candidate's scores for each of the basic requirements are weighted, in accordance with AFROTCI 36-2013, and a total score is calculated. This score is passed to the central selection board of AFROTC Officers. The selection board sets a cut-off in the rank-ordered scores based on the number of pilot slots available. No significant changes are made in the COM score based rankings used by this board.

The survey analysis will demonstrate that the portion of the Order of Merit score that correlates most highly with selection by the board is the Unit Commander's Ranking (UCR). According to AFROTCI 36-2013, the UCR provides an objective assessment of the cadet's officership potential. The Air Force Research Laboratory report by Weeks points out that the "detachment commander's assessments of cadets play a major role in the selection, or categorization, of ROTC cadets for flying training."¹² According to Dr.

Weeks, the UCR has a .921 correlation with selection and accounts for 85% of the variation in the COM score.¹³ He found that GPA is the next most influential component of the final score. Detachment or Unit Commanders are instructed by AFROTCI 36-2013 not to include GPA since it is already considered separately in the selection process. The same restriction exists for the Physical Fitness Scores (PFT). If the Commander were to employ these factors in determining the UCR, it would alter the weight of this component in the selection process. GPA, for instance, would be counted once in the overall calculation of the score and again as part of the UCR. Beyond considering the cadet's officership qualities, e.g., participation in cadet corps activities, the Commander is not given any further direction on what additional factors to consider when determining the UCR.

Although the Weeks report found that the UCR and the UPT selection process were highly related, it did not shed much light on the underlying factors influencing or causing this relationship. This report utilized a largely mathematical approach, which found no statistically significant difference between majority and minority applicants selected for pilot training. It looked no deeper than the apparent selection process. Further, although the report acknowledged that majority applicants consistently received higher rankings by their detachment commanders than minority applicants, it concluded that the UCR has no validity.¹⁴ Dr. Week's analysis of 400 ROTC cadets, representing all available candidates, revealed that the UCR has no relationship with their subsequent performance during pilot training.¹⁵ If this finding is accurate, the current selection process is flawed and does not select pilot candidates who will perform any better or worse in UPT than their peers.

Notes

¹ Population Estimates Program, Population Division, (U.S. Census Bureau, Washington, D.C. 20233), 4 June 1999.

² Current Population Reports, (U.S. Census Bureau, Washington, D.C. 20233), October 1998.

³ United States Air Force Personnel Center Web Page, 30 December 1999. Available from <http://www.afpc.randolph.af.mil/demographics/demograf/OSDPILOT.html>.

⁴ Mathews, John J., Racial Equity in Selection in Air Force Officer Training School and Undergraduate Flying Training, (AFHRL-TR-77-22). (Brooks Air Force Base, TX: United States Air Force Human Resources Laboratory), May 1977.

⁵ Jackson, Gene E., The Black Fighter Pilot—An Endangered Species, Air Command and Staff College, (Maxwell Air Force Base, Alabama), 1982, p. 28-29.

⁶ Mathews, p. 15.

⁷ Buchanan, Delbert H., Black Attrition in UFT, Air Command and Staff College, (Maxwell Air Force Base, Alabama), 1984, p. ix.

⁸ Ibid.

⁹ Ibid, 30.

¹⁰ Weeks, Joseph L., *Entry to Undergraduate Flying Training*. (AFRL-HE-AZ-TP-1998-0077). (Brooks Air Force Base, TX: Warfighter Training Research Division, United States Air Force Research Laboratory), August 1998, p. 29.

¹¹ AFROTCI 36-2013, 15 November 1999.

¹² Ibid, 28.

¹³ Weeks, 38.

¹⁴ Ibid, 39.

¹⁵ Ibid, 52.

Part 3

Survey Development and Analysis

There are three kinds of lies: lies, damned lies and statistics.

— Benjamin Disraeli

Survey Development

The criteria used by AFROTC Detachment Commanders to determine Unit Commander Rankings (UCR) were discovered via survey. The tabulated results of this survey are depicted in tables 3 and 4, Appendix B. If the pilot candidate ranking system is largely dependent on the scores assigned by Detachment Commanders, then it was necessary to discover precisely what criteria are being used to determine those scores. The survey was designed to do so based on probable factors used by Detachment Commanders in their determination of UCRs. Interviews were conducted with two of the four Regional AFROTC Commanders to determine what specific guidance they issued to their Detachment Commanders pertaining to the Unit Commander Ranking (UCR). Their responses indicated that Detachment Commanders are permitted a great deal of latitude in the factors they use as long as they adhere to the guidelines in the regulation. This corresponds with the direction specified in AFROTCI 36-2013. Additionally, one past and three present Detachment Commanders from the Northeast and Southeast regions

were interviewed to discover their particular methodology for UCR assignment. These interviews revealed that Detachment Commanders used a limited number of factors to determine the UCR. These criteria were specified in the final survey (see Appendix A). Additionally, the survey included factors such as GPA, PFT, and AFOQT scores that are already included in the overall COM score equation and are not supposed to be used as a basis for the UCR.

The survey requests the respondent to identify the Detachment number and number of years the Commander has served in that capacity. This demographic information was needed to track the responses and ensure the analysis included an adequate cross-section of the representative detachments. Next, the survey asked respondents to rate the importance of the various factors used in determining the UCR on a Lichert-type scale. To allow for factors that were not listed on the survey, the respondent was also asked for a listing and description of any additional criteria they used in their UCRs. Respondents were then asked to assign points, on a range of 0 to 100, to each of the factors, including those they added to the list, to provide a scalar representation of how they weighted each factor. The relative weighting was converted to a percentage for the purposes of the analysis. These percentages provided the basis for a detailed analysis of the factors used in this rating. Finally, the aggregated responses of Detachment Commanders that had an African-American selected for UPT were compared with those of Detachment Commanders that did not have an African-American selected.

UPT Candidate Selection Criteria

As described earlier, the Categorization Order of Merit (COM) is the measure used to determine whether an AFROTC cadet is admitted to UPT. The COM is comprised of

the Relative Standing Score (RSS), cumulative Grade Point Average (GPA), the Physical Fitness Test (PFT), and the Pilot Candidate Selection Method (PCSM). The UCR is divided by the class size of the detachment in order to arrive at the Relative Standing Score (RSS).¹ The formula for this calculation of the RSS is $(5*((1-R/C)+0.5/C))+5$ with $R = \text{UCR}$ and $C = \text{Class Size}$. For example, a cadet who is ranked by their Detachment Commander as first among 20 cadets would receive a RSS of 9.88. The RSS equation with these values would be: $(5*((1-1/20)+0.5/20))+5 = 9.88$. The cadet in that same detachment who is ranked lowest would have a RSS of 5.13. As shown in Table 1, the equation for calculating the COM is: $(\text{RSS} * 5) + (\text{GPA} * 5) + (\text{PFT} * .03) + (\text{PCSM} * .1516) = \text{COM}$.² If each of the cadets in the previous example had received the maximum score on the other factors, their respective COM scores would be 99.4 and 75.7. The equation for the highest ranked cadet would appear as: $(9.88 * 5) + (4 * 5) + (500 * .03) + (99 * .1516) = 99.4$. In this case, the cadet with the highest RSS would have a higher COM score than the cadet with the lowest RSS even if his GPA were 0.

Table 1. Order of Merit Factors³

<i>Factor</i>	<i>Range</i>	<i>Multiplied By</i>	<i>Weight</i>
RSS	5-10	5	50%
Cum GPA	2.0-4.0	5	20%
PFT	140-500	0.03	15%
PCSM	1-99	0.1516	15%

As described earlier, the Unit Commander Ranking (UCR) is a component of the COM score. The UCR is normalized for class size and designated as the Relative Standing Score (RSS) before being included in the equation. The relative importance of the RSS is represented in the equation as comprising half of the COM score. However,

since the scores are forced to occupy the entire range and the scores for the other factors of the COM score are not, the impact of the RSS is greater. In other words, the Detachment Commander must assign a different UCR to each cadet but any number of cadets may have the same GPA or PFT score. When combined with a cadet's Cumulative GPA, the RSS accounts for more than two thirds of the variability of the COM. In research conducted by the Air Force Research Laboratory, this weighting resulted in a correlation between the RSS and the COM of .921.⁴ Based on the laboratory's reports, the RSS accounts for about 85% of the variation in the COM while RSS and GPA together account for 91% of the variation. The formula has changed to allot still more weight to RSS and GPA, since the original research was accomplished, thus magnifying the influence of those factors further. Consequently, Detachment Commander's subjective ratings, i.e., the UCR translated to RSS, have an overriding impact on whether or not a particular cadet is selected for pilot training.

Factor Analysis

Detachment Commanders were surveyed to discover the criteria they used to determine the UCR for each cadet and how the criteria were weighted. 115 of the 143, (80%) of the AFROTC Detachment Commanders responded to the survey in January-February 2000. The results were compared to determine what adverse impact, if any, their use of various factors had on African-American selection for UPT. Figures 2 and 3 provide a graphic illustration of the factors identified by the survey. By comparing the responses given by Detachment Commanders having an African-American selected for UPT with those that did not, we can get some idea of which factors potentially enhance or inhibit pilot candidate selection for African-American ROTC cadets. Also, the survey

results provided insights on whether factors are used in a consistent manner across detachments, how the average commander weights each factor, and if the factors are objective. Finally, based on the available previous research, these factors were examined for their validity in terms of predicting performance in UPT. A detailed summation of the survey results is in Appendix B.

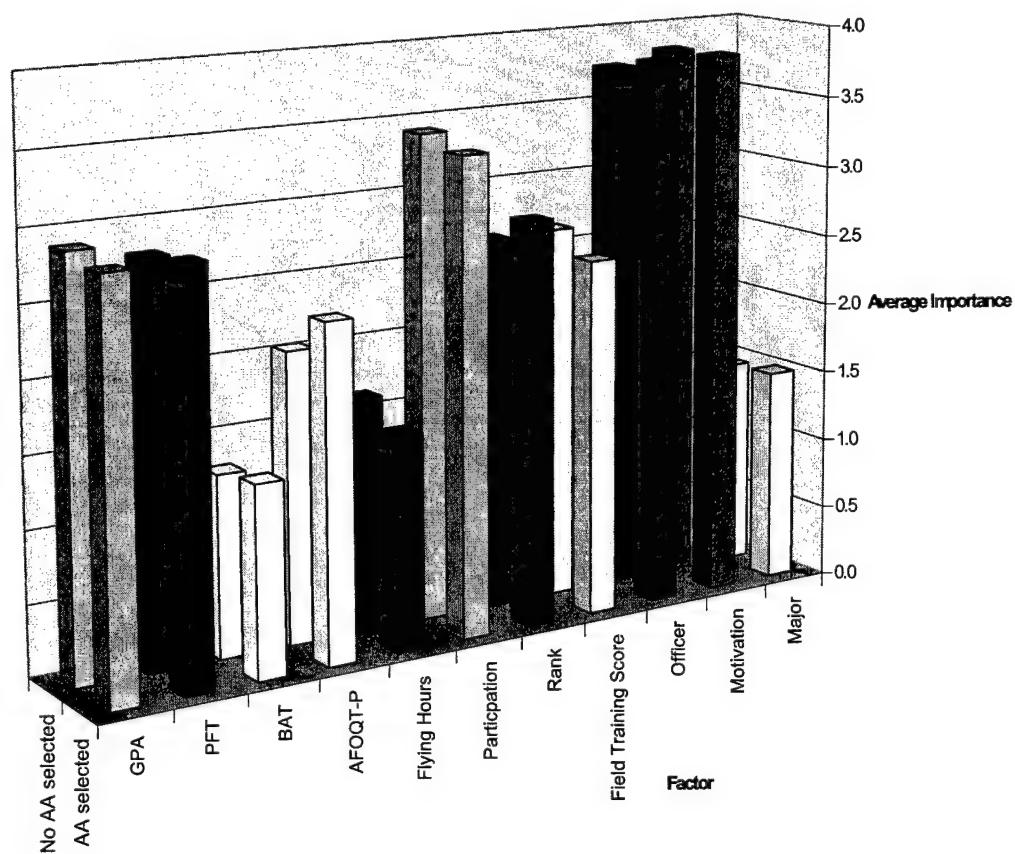


Figure 2. UCR Factor Importance Comparison

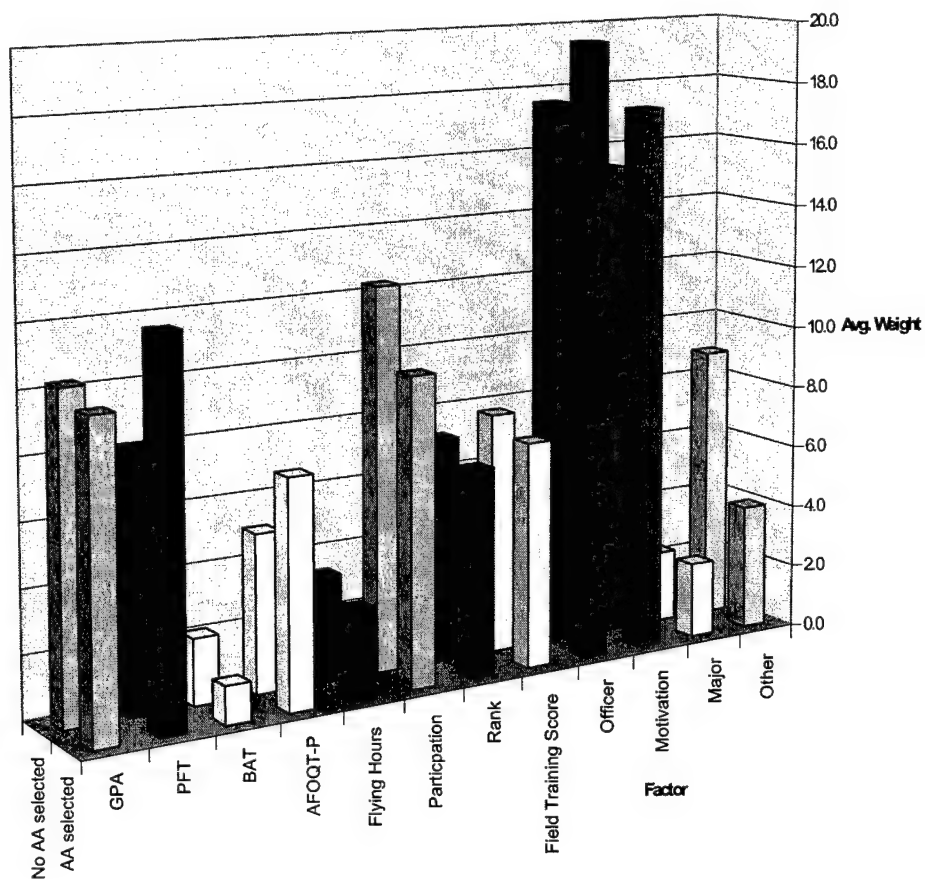


Figure 3. UCR Factor Weight Comparison

Cumulative Grade Point Average

As described earlier, cumulative Grade Point Average (GPA) is included as part of the COM equation and AFROTCI 36-2013 specifies that GPA, along with the PFT and standardized test scores that comprise the PCSM, “should only indirectly affect the ranking as they relate to demonstrated ability to balance numerous responsibilities at once”.⁵ Therefore, one might expect Detachment Commanders to rank the relative importance of these factors as “Very Unimportant” or “Not Used” on the question

relating to the importance of the factor in determining the UCR and that the relative weight assigned to this factor would be low. In fact, several respondents responded exactly in that fashion, as well as pointing out that the regulation prohibits them from including these factors directly in their assessments. One respondent explained that he was indirectly affected by his knowledge of a cadet's GPA, but attempted to ignore it since it was already objectively accounted for in the COM. However, as can be seen in Figure 3, 91% of Detachment Commanders rate the use of GPA as an important or very important factor in calculating the UCR.

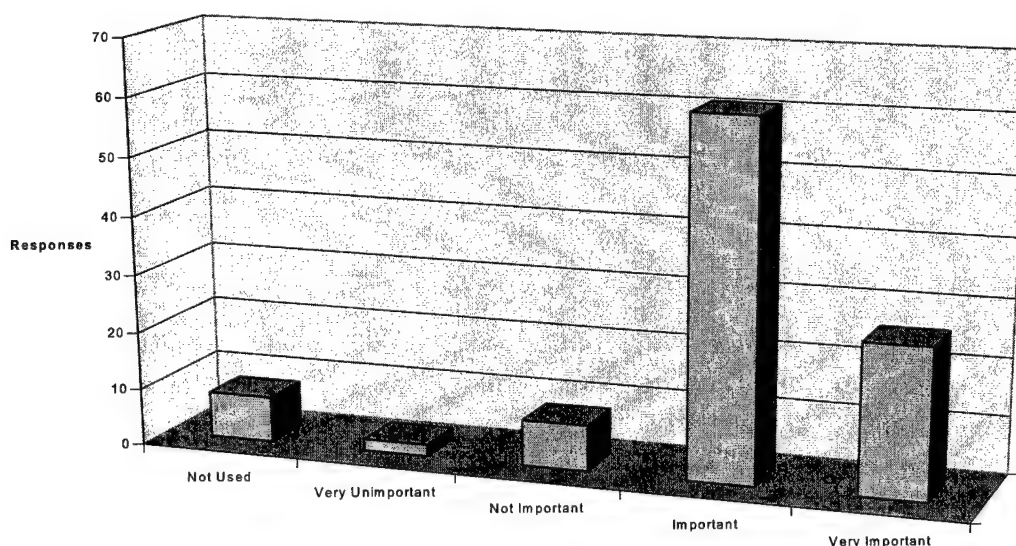


Figure 4. GPA Importance Responses

As Figures 2 and 3 illustrate, GPA is ranked fairly high, fourth out of eleven in importance and in relative weighting, fourth out of twelve. A value of 1.0 in the question on importance is equivalent to "Very Unimportant", 2.0 equivalent to "Not Important", 3.0 to "Important", and 4.0 to "Very Important". The answers given for GPA range from

0 to 4.0 and average 2.9. Comparatively, for Detachment Commanders having African-Americans selected to UPT, the average rating for GPA is an identical 2.9. According to the definitions used in the survey (see Appendix B), Detachment Commanders believed GPA was an important factor for determining the UCR. In terms of relative weight, GPA is, on average, used for about 10.2% of the overall calculation of the UCR with a range of responses from 0% to 30%. For those Commanders with African-American UPT selectees, the average weight of the GPA is 9.8%. The use of GPA also varied so that a cadet in one university would have almost one third of the UCR determined by it while in another university it was not used at all.

Based on interviews and survey responses, GPA also influences cadet rank, and other subjective measures, such as officership and motivation used to determine the UCR. Consequently, the true influence of this factor is strengthened still further. Additionally, 9% of Detachment Commanders consider a cadet's major field of study as an important factor in making subjective ratings. While this could be due to publication of earlier research finding technical majors are better performers in UPT, it may be an attempt by the commanders to normalize GPAs between majors that are subjectively perceived to be of differing levels of difficulty.

In fact, cumulative GPAs among differing universities and fields of study are not normalized unless the Detachment Commander sees fit to do so. Since the survey results indicate that only approximately 2.3% of the average aggregated UCR is determined by major, most Commanders appear to make no adjustment for student's field of study. This means that a 4.0 Cumulative GPA in Astronautical Engineering at Stanford is equivalent to a 4.0 Cumulative GPA in Physical Education at Fresno State when calculating the

COM score. The consequences of this situation for the Air Force are minimal, since research by the Air Force Air Education and Training Command found that neither GPA nor major field of study has any correlation with later performance in pilot training.⁶

In summary, the survey results show that undifferentiated GPAs are a significant component of the UCR. This confounds the weighting requirement specified in AF instructions for the COM formula. Furthermore, this condition is magnified when one considers the role GPA plays in other UCR sub-factors. There is no standardization between institutions and major fields of study in most cases. Additionally, objective data on the relationship between GPA and performance in Undergraduate Pilot Training suggests that it is not predictive, therefore undermining its relevance as a selection criterion. Finally, there is little or no difference between detachments with African-Americans selected for UPT and those that did not.

Physical Fitness Score

Like GPA, the Physical Fitness Test (PFT) Score is already objectively accounted for in the Order of Merit score and, by regulation, should not be directly used to determine the UCR. Including the PFT when determining the UCR confounds the weighting used for the COM score calculation. However, the weighting and range of PFT scores are vastly different from GPA. It correlates poorly with UPT selection, since PFT scores account for little of the variance in COM scores (see Appendix B). In terms of importance on the survey, the PFT was given an average score of 2.8, with a range from 0 to 4.0. Comparatively, for detachments with African-Americans selected, the average was also 2.8.

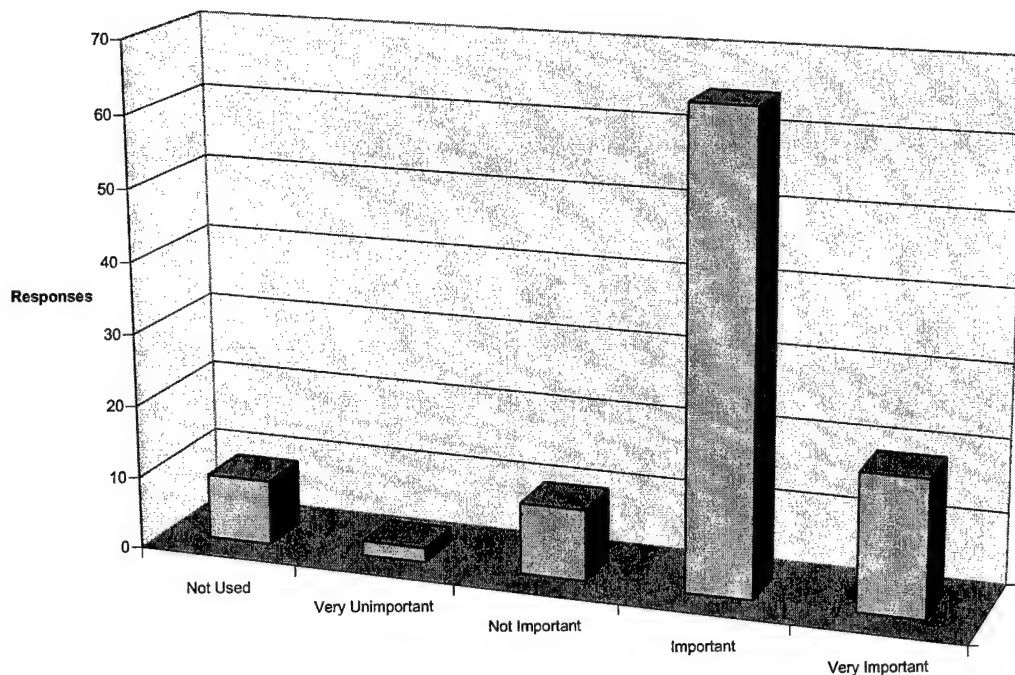


Figure 5. PFT Importance Responses

In terms of relative weight, the PFT accounted for 8.3% of the UCR, and ranged from a low of 0% to a high of 22%. For those detachments with UPT selectees that were African-American, the PFT was allotted 12% of the relative weight. This indicates that a majority of Detachment Commanders considers the PFT significant in determining the UCR. Further, the use of the PFT varies widely among detachments so that a cadet in one university will have only have to pass the PFT in order to qualify while another cadet's actual PFT score will have a significant impact on their selection.

In summary, the Physical Fitness Test is an objective measure, but its overall weighting is confounded and varies between detachments due to its use as a sub-component of the UCR. It has little impact on selection for UPT unless a cadet cannot achieve the minimum score. Even in extreme cases, PFT accounts for just over 5% of the

total COM score. Additionally, there is no available research that examines the relationship between PFT scores and subsequent performance in UPT.

Pilot Candidate Selection Method

The Pilot Candidate Selection Method (PCSM), comprised of the Basic Attributes Test (BAT), the Air Force Officer Qualifying Test Pilot Portion (AFOQT-P), and flying hours, ostensibly represents 15% of the total weighting of the overall COM score. Due to the variation in ranges, multipliers, and weighting among the components of the COM score, PCSM has very little influence on the total. PCSM is comprised of measures associated with success at Undergraduate Pilot Training. Air Education and Training Command SAS/CS maintains data pertaining to PCSM scores versus actual graduation rates from 1,149 students for the initial training aircraft in UPT, T-37s.⁷ Those with a PCSM score between 1 and 25 had a graduation rate of 64% ($\text{Graduates} / (\text{Graduates} + \text{Flight Training Deficiencies} + \text{Self Initiative Excuses})$). Students with a PCSM score from 26 to 50 had a graduation rate of 75%. Those with a PCSM score between 51 and 75 had a graduation rate of 89%. Students with a PCSM score in the highest quartile, with a score between 76 and 99, had a graduation rate of 96%.

The raw PCSM formula includes previous powered flying hours, the AFOQT pilot composite score, and subcomponents of the BAT, (i.e., psychomotor skills, item recognition, timesharing, response times, and activities inventory). The percentages allotted to each factor can be seen in Table 2.

Table 2. PCSM Composition

<i>Factor</i>	<i>Percentage</i>
AFOQT-P	18.6
Flying Hours	17.1
BAT	
Psychomotor Skills	11.0
Item Recognition	7.3
Timesharing	15.4
Response Times	17.3
Activities Inventory	13.3

The PCSM Program Manager would not release details of the actual algorithm as it is considered "test sensitive", its release could provide an unfair advantage to cadets exposed to this report.

Basic Attributes Test.

"The BAT consists of five subtests that measure psychomotor skills, cognitive aptitude, and personality traits."⁸ Many Commanders responding to the survey complained that the test was administered to cadets during field training under varying conditions of alertness, fatigue, and sleep deprivation. This perception may contribute to the 'Very Unimportant' designation, on average, assigned by the respondents to this factor. The BAT was rated at 1.3 in terms of importance by both groups of detachments examined in this study. Based on survey responses, the BAT was considered, on average,

less important than any of the other factors and given a lower relative weight, 2.2, than any other factor. The relative weight was even lower, 1.2, for the African-American selectee group. Therefore, the BAT's contribution to the COM score is small. This is true even when one considers the fact that the BAT score is already included in the PCSM.

Air Force Officer Qualifying Test – Pilot Portion.

According to the AFOQT Test Pamphlet,

The AFOQT-P is a multiple choice test that measures some of the knowledge and abilities considered essential for successful completion of pilot training. The Pilot composite includes subtests which evaluate verbal ability, knowledge of aviation and mechanical systems, the capacity to determine aircraft altitude from instruments, knowledge of aeronautical concepts, the aptitude for reading scales and interpreting tables, and certain spatial abilities.⁹

The research described earlier by Dr. Weeks found that higher AFOQT-P scores lead to fewer pilot training failures.¹⁰ He emphasized that this finding was consistent with previous research indicating that the single best predictor of pilot training attrition was the AFOQT composite.¹¹ Further, work completed by Arth, Steuck, Sorrentino, and Burke in 1990 agreed that higher scores on the AFOQT corresponded with lower UPT failure rates, making the test a valid predictor.¹² These studies led Dr. Weeks to call for an increased weighting for the AFOQT-P in the COM equation although his colleague, Dr. Carretta, found that "analyses of AFOQT scores for over one quarter million majority applicants were more than one standard deviation higher than those for minority applicants."¹³ Dr. Weeks concluded that there would be a resultant trade-off between a lower number of African-Americans qualifying for UPT and a lower attrition rate.

Survey results indicate that Commanders rate the AFOQT-P from a high of 4 in importance to a low of 0, with an average of 2.0. Comparatively, for those Commanders that had an African-American selected, the average was 2.3. In overall responses to the

relative weight question, respondents indicated that the AFOQT-P was given a relative weight of 5.0%. The majority of Detachment Commanders allotted less than 10% of the UCR to the AFOQT-P. For those with African-American selectees, the relative weight averaged 7.2%. Contrary to the earlier research conducted by Dr. Weeks, these results seem to indicate that a higher weighting of the AFOQT-P resulted in higher UCRs and more African-Americans being selected for UPT.

Flying Hours.

Responses for flying hours in terms of importance range from 0 to 4 in importance and 0 to 20 in relative weight. The averages are 1.7 and 3.4, respectively, demonstrating the low relative impact that this factor has on calculation of the UCR. The averages were nearly identical for those detachments with African-Americans selected for UPT. Some written responses on the survey indicated the Detachment Commanders perceived that this factor could be purchased if the cadet was from a wealthy family, thus leaving the less privileged cadets at a disadvantage. Accordingly, they minimized the importance of this factor in determining the UCR.

Participation

Participation in cadet corps activities was defined by the survey as including military formations, community service, etc. Overall, Detachment Commanders gave such activities an average importance of 3.4 and an average relative weight of 12.3%. For those who had African-Americans selected for UPT, the average importance was 3.3 and the average relative weight was 9.8%. Based on the results of the survey and interviews, participation does not appear to be a standardized measure. Although Detachment Commanders consider it important, it is calculated very differently among detachments.

One Commander might use class attendance as a criterion, while another might use attendance at extracurricular unit activities. There is no data available on the relationship between cadet participation and later UPT performance.

Rank

Rank or cadet position, was allotted an average importance of 2.6 and an average weight of 7.2%. For those who had African-Americans selected for UPT, the average importance was 2.8 and the average relative weight was 6.6%. Based on interviews, rank is determined in part by GPA. This confounds the influence of both rank and GPA since GPA is a subcomponent of rank, a subcomponent of the UCR, and a subcomponent of the COM score. There is no known correlation between cadet rank and performance in UPT.

Field Training Score

An AF fact sheet describes ROTC field training as follows:

Air Force ROTC cadets and two-year program applicants complete field training prior to enrolling in the Professional Officership Course. Field training is normally completed during the summer between a cadet's sophomore and junior year. In most cases, field training is the student's first exposure to a working Air Force environment where he or she learns and applies leadership theory and techniques as well as officership training. During field training, the Air Force also has the opportunity to evaluate each student's potential as an officer.¹⁴

Field training results are tabulated into a composite score. The field training score was rated as an average 2.7 in importance and allotted an average of 7.8% of the relative weight of the UCR. For those Detachments with African-American UPT selectees, the average importance was 2.5, while its relative weight was 7.2%.

Officership

Officership was identified on the survey as "Demonstrated Officership Qualities" and described as including military bearing, discipline, and wear of the uniform. Survey responses indicated that Detachment Commanders consider this factor the second most important with an average score of 3.7. In terms of relative weight, officership was allotted more than any other factor with 17.5% of the average total score. For those Detachments with African-American UPT selectees, the average importance was 3.8, while its relative weight was 19.6%. There is no standardized means of measuring officership, so it is a subjective measurement. The high relative weight given to this factor reinforces the notion that Detachment Commanders are attempting to select good officers, based on the 'whole person' concept, as well as good pilots.

Motivation

Motivation was defined by the survey as: stated desire to compete, improvement, and effort in unit activities. This factor was rated first in importance, with a 3.8 average, and second in relative weight, with an average of 15.4%. For those Detachments with African-American UPT selectees, the average importance was also 3.8, while its relative weight was slightly higher at 17.4%. Motivation is not a standard or objective measure and its correlation with performance at pilot training is unknown.¹⁵

Major

Major was defined by the survey as: technical versus non-technical degree. This factor was rated second lowest in importance, with a 1.5 average, and second lowest in relative weight, with an average of 2.3%. For those Detachments with African-American UPT selectees, the average importance was also 1.5, while its relative weight was slightly

higher at 2.4%. There is no data available on the correlation between major and pilot performance with the exception of the report by Buchanan. Buchanan states, "Although individuals with technical degrees don't score as high on the AFOQT-P, they still have a higher completion rate than non-technical degree holders."¹⁶ Based on interviews and the survey responses, major field of study is not widely used as a factor in determining the UCR and has little influence on selection rates.

Other

Respondents were given an opportunity to add factors that were not present on the original survey. Less than 10% added factors, several of which were slight modifications, sub-categorizations, or delineations of factors that were already present. "Gut feel", "best guess", law enforcement record, university class rank, attitude, aerospace studies course grade, civic involvement, interpersonal skills, and inputs from Non-Commissioned Officers on the ROTC staff were among the factors added. These factors were allotted 9%, on average, of the total weighting of the UCR. For those Detachments with African-American UPT selectees, the relative weight averaged 4%.

There was no other factor consistently added by Detachment Commanders to the survey. This suggests that the factors presented in the survey instrument were relatively comprehensive.

Notes

¹ AFROTCI 36-2013, 15 November 1999, p. 2.

² Ibid, p. 3.

³ Ibid.

⁴ Weeks, Joseph L., *Entry to Undergraduate Flying Training* (AFRL-HE-AZ-TP-1998-0077). (Brooks Air Force Base, TX: Warfighter Training Research Division, United States Air Force Research Laboratory, August 1998), p. 38.

⁵ AFROTCI 36-2013, p. 3.

Notes

⁶ Manacapilli, Tom. AETC SAS Commander, Address. 1 February 2000.

⁷ PCSM Program Manager, AETC SAS/SC, February 2000.

⁸ Ibid.

⁹ AFOQT Sample Test Pamphlet AFPT 997, Department of the Air Force, July 1999.

¹⁰ Weeks, 52.

¹¹ Carretta, T. R. and Ree, M. J. *Pilot candidate selection method (PCSM): What makes it work?* (AL-TP-1993-0063, AD A262 871). (Brooks Air Force Base, TX: Armstrong Laboratory, Human Resources Directorate, Manpower and Personnel Research Division), 1993.

¹² Arth, T.O., Steuck, K.W., Sorrentino, C.T., and Burke, E.F. *Air Force Officer Qualifying Testing (AFOQT): Predictors of undergraduate pilot training and undergraduate navigator training success* (AFHRL-TP-89-52, AD A221 674). (Brooks Air Force Base, TX: Air Force Human Resources Laboratory, Manpower and Personnel Research Division), 1990.

¹³ Weeks, 54.

¹⁴ AF Fact Sheet 98-06, HQ Air Force Officer Accession and Training Schools, (Public Affairs, (AFOATS), 551 East Maxwell Blvd., Maxwell AFB AL 36112-6106).

¹⁵ Manacapilli.

¹⁶ Buchanan, Delbert H. *Black Attrition in UFT*. (Air Command and Staff College, Maxwell Air Force Base, Alabama), 1984, p. 38.

Part 4

Conclusion and Recommendations

Conclusion

The survey results, in combination with previous research conducted by Dr. Weeks, indicate that many factors highly weighted in UCR calculations are not predictive of performance in UPT. Based on the results of this study, there were no significant differences between detachments on the factors determining the COM score. This indicates that there is no apparent racial bias in the overall AFROTC UPT selection process or in the individual detachment rating assessments. As seen in the previous analysis, if the factors used by Detachment Commanders are averaged and included as a subset of the COM formula, the resultant formula is relatively complex. $((\text{GPA} * 10.2 + \text{PFT} * 8.1 + \text{BAT} * 2.1 + \text{AFOQT-P} * 5 + \text{Flying Hours} * 3.3 + \text{Participation} * 12.3 + \text{Rank} * 7.2 + \text{Field Training Score} * 7.7 + \text{Officership} * 17.6 + \text{Motivation} * 15.4 + \text{Major} * 2.3 + \text{Other} * 9) / 100 * 5) + (\text{GPA} * 5) + (\text{PFT} * .03) + (\text{PCSM} * .1516) = \text{COM}$. The complexity of this formula obscures how and why cadets are chosen for UPT. As discussed in the previous analysis, the existing process relies heavily on subjective criteria with little or no relevance to UPT performance. This subjectivity makes it difficult, if not impossible, to accurately determine the exact reasons for the disproportionately low selection rates of African-Americans to UPT.

Based on the results of this study, the only substantive differences in factor weighting between detachments that had African-Americans selected for UPT and those that did not involved the PFT, AFOQT-P, participation, officership, and motivation. Since participation, officership, and motivation are all subjective measures applied in a non-standard fashion to COM calculations, it would appear that changes in these criteria would have little impact on UPT selection rates for African-Americans. One might question their relevance since there is no research that indicates these factors have any relationship with later UPT performance.

AFROTCI 36-2013 clearly prohibits commanders from including the PFT and AFOQT-P in their UCRs, since they are separate components of the COM score. Although the PFT was given a higher relative weight by those detachments with African-American selectees, 12% vs. 8%, this factor has no known correlation with performance in pilot training. The AFOQT-P also was given a higher average relative weight by those detachments with African-American selectees, 7.2% vs. 5% for those detachments with no African-American selectees. This survey result is the opposite of the effect predicted by Dr. Weeks who concluded that a heavier weighting of the AFOQT-P would result in fewer African-Americans being selected. The AFOQT-P however, is already objectively accounted for in the COM score. Furthermore, there is little or no difference in objective measures used by detachments to calculate the COM. Therefore, the lower selection rate for African-Americans must be either a result of the use of subjective factors that do not predict UPT performance, or the use of objectively measured factors forbidden by regulation.

Many survey respondents commented that they are satisfied with the current system. The Commanders are senior Air Force officers, many of whom are rated. This should give them a great deal of insight into the potential of each cadet. However, the survey results indicate that selection is based largely on "the whole person concept" rather than selecting those who would make the best pilots. This is in keeping with the instruction but it confuses the issue. Last year, only 7 African-Americans were selected by AFROTC for pilot training, while 453 Caucasians were selected.¹ Analysis of the survey results suggests that selection was based on factors that were subjective, not predictive of performance in UPT, and not standardized among detachments.

In summary, the AFROTC selection process for UPT is flawed. Analysis by Dr. Weeks and this study clearly indicates that UCR is the most heavily weighted component of the COM score and relates most directly to selection for UPT. Furthermore, analysis of the survey results shows that the factors most often used by Detachment Commanders to arrive at the UCR are forbidden by regulation, subjective, and are not valid predictors for performance in UPT. The complexity of the method, resulting from lack of standardization, obscures the reason for low African-American selection rates

Limitations

Due to lack of access to the current database, this study did not analyze the demographics of each detachment individually and compare the subsequent majority vs. African-American selection rates. Additionally, due to the relatively low response rate from Historically Black Colleges and Universities, a comparative analysis of their selection criteria was omitted. Future researchers might gain useful insights by further examination of these areas.

Recommendations

It is recommended that AFROTC reexamine the philosophy underlying the current system for selecting UPT candidates. If the purpose of the system is to select those cadets with the highest potential for completing UPT, the current system should be replaced with the Pilot Candidate Selection Method (PCSM). As discussed in the analysis, the PCSM has the highest correlation with success in pilot training and offers the most precise, objective indication of pilot potential among cadets. This will allow AFROTC to make clear decisions based on predictive criteria. The PCSM is far more objective, standardized, and could reduce the attrition rate at UPT.

Based on Dr. Week's findings, using the PCSM may decrease the number of African-Americans selected. However, in 1999, detachments that had an African-American selected for UPT weighted the PCSM more highly than those that did not. Assuming that detachment commanders are motivated to choose criteria that provide their cadets with the best chance for selection to UPT, this indicates that Dr. Week's findings may be incorrect and that more African-Americans will be selected if the PCSM is adopted. In any case, based on previous research, those African-Americans selected by using the PCSM should have a lower attrition rate during UPT.

If the PCSM were administered to all ROTC cadets, under standardized conditions, i.e., not under the duress of field training, commanders might place more value and emphasis on this measure. As a result, actions could be taken to increase diversity. Using standardized testing procedures and conditions would also strengthen the validity and reliability of the measure. In addition to providing the Air Force with a more reliable

predictor of UPT performance, reliance on these objective measurements could motivate more cadets to compete for selection.

African-Americans with high PCSM scores would be encouraged by the knowledge that they have the attributes essential to doing well at UPT. This would presumably increase their motivation to apply for UPT selection. Furthermore, those African-Americans that have relatively high AFOQT-P and BAT scores, but no flying hours could be given an opportunity to build flying hours. This would allow greater numbers of African-Americans to increase their overall PCSM ranking, thus enhancing their chances of selection.

For those detachments that do not have the means to purchase flying hours there are a variety of possible solutions. For example, a pilot program spearheaded by the AFROTC Southeast Regional Commander increases exposure to instrumentation and flying skills using PC based training. It is hoped that this experience can provide cadets with valuable flying experience at low cost. Additionally, the Air Force is developing an introductory flight program. This program will provide an opportunity for those with limited means to build flight time and develop flight related skills.

By adopting such a system, AFROTC would have an objective, standardized selection process that is focused on selecting those cadets with the highest potential for completing UPT. This would focus this particular process on choosing pilots and allow the remainder of the AFROTC program to train and screen officers. This simplified system would enable widespread assessment of the potential of a greater number of cadets and prospective cadets. This assessment can then be used as a tool for increasing the diversity of the pilot force so that it may reflect the fabric of America.

Notes

¹ Headquarters Air Force Reserve Officer Training Corps, Cadet Personnel Section, February 2000.

Appendix A

Survey

Detachment _____

1. How many years have you served as the detachment commander?

Less than 1 1-2 3-4 5 or more

2. When determining the Unit Commander Ranking (UCR, see AFROTCI 36-2013 para. 4.5, 9.2) for cadet entry to Undergraduate Pilot Training (UPT), how important are the following factors? Circle the corresponding number. If you do not use that factor, circle NU.

Not Used NU	Very Important 4	Important 3	Not Important 2	Very Unimportant 1
Cumulative Grade Point Average (GPA) (As described in AFROTCI 36-2013 para. 3)				NU 4 3 2 1
Physical Fitness Score (PFT) (As described in AFROTCI 36-2013 para. 7.1)				NU 4 3 2 1
Basic Attributes Test Score (BAT) (As described in AFROTCI 36-2013 para. 18.3)				NU 4 3 2 1
AFOQT-P Score (As described in AFROTCI 36-2013 para. 7.2.1)				NU 4 3 2 1
Flying Hours (As described in AFROTCI 36-2013 para. 18.3)				NU 4 3 2 1
Participation in Cadet Corps Activities (i.e. Formations, Community service, etc.)				NU 4 3 2 1

Cadet Position/Rank

NU 4 3 2 1

Field Training Score
(AF/ROTC Form 708)

NU 4 3 2 1

Demonstrated Officership Qualities
(Military Bearing, Discipline, Wear of Uniform)

NU 4 3 2 1

Motivation
(Stated desire to compete, improvement, effort in Unit activities)

NU 4 3 2 1

Major
(Technical vs. Non-technical degree)

NU 4 3 2 1

(ACSC Survey 99-100)

3. If there are any other factors you use to determine the UCR, please list and describe them. (Continue on the back if necessary)

4. Using a total of 100 points, indicate the relative weight of each factor you use to determine the UCR. Allot points to the factors from Question 2 (excluding those marked NU) as well as those you may have listed in question 3 (use the blank spaces, if applicable). *Ensure that you give some points to every factor you use.*

Factors

Points

GPA

PFT

BAT

AFOQT-P

Flying Hours

Participation

Cadet Position/Rank

Field Training Score

Officership Qualities

Motivation

Major

Total = 100 points

5. Do you have any suggestions for changing the system used to select ROTC cadets for UPT? What are they?

(ACSC Survey 99-100)

Appendix B

Survey Results Summary

Table 3. Importance Comparison

<i>Factors by %</i>	<i>GPA</i>	<i>PFT</i>	<i>BAT</i>	<i>AFOQT-P</i>	<i>Flying Hours</i>	<i>Participation</i>	<i>Rank</i>	<i>Field Training Score</i>	<i>Officership</i>	<i>Motivation</i>	<i>Major</i>
No AA selected	2.9	2.8	1.3	2.0	1.6	3.4	2.6	2.6	3.7	3.8	1.5
AA selected	2.8	2.8	1.3	2.3	1.5	3.3	2.8	2.5	3.8	3.8	1.5

Table 4. Relative Weight Comparison

<i>Factors by %</i>	<i>GPA</i>	<i>PFT</i>	<i>BAT</i>	<i>AFOQT-P</i>	<i>Flying Hours</i>	<i>Participation</i>	<i>Rank</i>	<i>Field Training Score</i>	<i>Officership</i>	<i>Motivation</i>	<i>Major</i>	<i>Other</i>
No AA selected	10.2	8.1	2.1	5.0	3.3	12.3	7.2	7.7	17.6	15.4	2.3	9
AA selected	9.8	12.0	1.2	7.2	2.8	9.8	6.6	7.2	19.6	17.4	2.4	4.0

Bibliography

- Air Force Fact Sheet 98-06. *HQ Air Force Officer Accession and Training Schools*. Public Affairs, (AFOATS), 551 East Maxwell Blvd., Maxwell AFB AL 36112-6106.
- AFPT 997. *Air Force Officer Qualifying Test Sample*. Department of the Air Force, July 1999.
- Air Force Reserve Officer Training Corps Instruction 36-2013*. 15 November 1999.
- Armour-Lightner, Rosetta A. *How to Improve Accession Rates and Promotability of Black Officers Commissioned through the Air Force Reserve Officer Training Corps*. Air War College, Maxwell Air Force Base, Alabama, May 1985.
- Arth, T.O., Steuck, K.W., Sorrentino, C.T., and Burke, E.F. *Air Force Officer Qualifying Testing (AFOQT): Predictors of undergraduate pilot training and undergraduate navigator training success* (AFHRL-TP-89-52, AD A221 674). Brooks Air Force Base, TX: Air Force Human Resources Laboratory, Manpower and Personnel Research Division, 1990.
- Bragg, Janet Harmon. *Soaring Above Setbacks: The Autobiography of Janet Harmon Bragg, African American Aviator*. Washington, DC: Smithsonian Institution Press, 1996.
- Bryant, Carl. *Minority Attrition in Undergraduate Flying Training: An Assessment Based on Ability and Environment*. Department of Behavioral Sciences and Leadership, USAFA, 1989.
- Buchanan, Delbert H. *Black Attrition in UFT*. Air Command and Staff College, Maxwell Air Force Base, Alabama, 1984.
- Carretta, T. R. *Sex and Ethnic group differences in U. S. Air Force pilot selection tests* (AL/HR-TP-1996-26). Brooks AFB, TX: Manpower and Personnel Research Division, Armstrong Laboratory Human Resources Directorate, 1996.
- Carretta, T. R. and Ree, M. J. *Pilot candidate selection method (PCSM): What makes it work?* (AL-TP-1993-0063, AD A262 871). Brooks Air Force Base, TX: Armstrong Laboratory, Human Resources Directorate, Manpower and Personnel Research Division, 1993.
- Current Population Reports*. U.S. Census Bureau, Washington, D.C. 20233, October 1998.
- Delaney, H. "Dichotic listening and psychomotor task performance as predictors of naval primary flight training criteria." *International Journal of Aviation Psychology*, 2(2), 107-120, 1992.

Equal Pay Act of 1963; Title VII of the Civil Rights Act of 1964; the Age Discrimination in Employment Act of 1967; and Section 501 of the Rehabilitation Act of 1973.

Fogleman, Ronald R. Chief of Staff, US Air Force. "Tuskegee Airman: Breaking the Myths." Address. Tuskegee Airmen Convention Banquet, Atlanta, 12 August 1995.
Freydberg, Elizabeth H. *Bessie Coleman, The Brownskin Lady Bird*. New York, Garland Pub., 1994.

Gibb, G.D. and Dolgin, D.L. "Predicting military flight training success by a compensatory tracking task." *Military Psychology*, 1(4), 235-240, 1989.
Gubert, Betty Kaplan. *Invisible Wings: An Annotated Bibliography on Blacks in Aviation, 1916-1993*. Westport, CT, Greenwood Press, 1994.

Hardesty, Jon and Pisano, Domenick. *Black Wings: The American Black in Aviation*. Washington, National Air and Space Museum, 1984.
Headquarters Air Force Reserve Officer Training Corps, Cadet Personnel Section, February 2000.
Herriot, Peter. *Competitive advantage through diversity: organizational learning from difference*. London (England): Thousand Oaks, CA: Sage Publications, 1995.
Hunter, D. R., and Burke, E. F. "Predicting Aircraft Pilot Training Success: A Meta-Analysis of Published Research." *International Journal of Aviation Psychology*, 4, 297-313, 1994.

Jackson, Gene E. *The Black Fighter Pilot—An Endangered Species*. Air Command and Staff College, Maxwell Air Force Base, Alabama, 1982.
Jakeman, Robert J. *America's Black Air Pioneers, 1900-1939*. Maxwell AFB, AL, Air Command and Staff College, 1988.

Kitchens, John W. "They Also Flew: Pioneer Black Army Aviators." *U.S. Army Aviation Digest*, pt 1: September-October 1994, pp 34-39, pt 2: November-December 1994 pp 34-39.

Loving, Neal V. *Loving's Love: A Black American's Experience in Aviation*. Washington: Smithsonian Institution Press, 1994.

Manacapilli, Tom. AETC Studies and Analysis Squadron Commander, Address. 1 February 2000.
Mathews, John J. *Racial Equity in Selection in Air Force Officer Training School and Undergraduate Flying Training* (AFHRL-TR-77-22). Brooks Air Force Base, TX: United States Air Force Human Resources Laboratory, May 1977.

Pellum, Martin W. *Air Force Recruiting: Considerations for Increasing the Proportion of Black and Hispanic Persons in the Enlisted Force*. Maxwell Air Force Base, AL: Air University Press, March 1996.

Pilot Candidate Selection Method Program Manager, Air Education and Training Command SAS/SC, February 2000.

- Population Estimates Program*. Population Division, U.S. Census Bureau, Washington, D.C. 20233, June 4, 1999.
- Powell, William J. *Black Aviator: The Story of William J. Powell*. Washington, DC: Smithsonian Institution Press, 1994.
- Rich, Doris. *Queen Bess: Daredevil Aviator*. Washington: Smithsonian Institution Press, 1993.
- Roosevelt, Thomas, R. *Beyond race and gender: unleashing the power of your total work force by managing diversity*. New York: AMACOM, c1991.
- Schlitz, William P. "Blacks in U. S. Aviation: The Pioneers." *Air Force Magazine*, Pt. 1, 66:68-72 January 1983, Pt. 2, 66:74-79 February 1983.
- Smith, Perry. "Blacks in Military Aviation--The Beginning." *U.S. Army Aviation Digest*, pp 26-28 June 1988. *The Chicago Manual of Style*. 14th ed. Chicago: The University of Chicago Press, 1993.
- Simons, George F., Vazquez, Carmen, and Harris, Philip R. *Transcultural Leadership: Empowering the Diverse Workforce*. Houston, TX: Gulf Publishing Co., 1993.
- United States Air Force Personnel Center Web Page, 30 December 1999. Available from <http://www.afpc.randolph.af.mil/demographics/demograf/OSDPILOT.html>.
- Weeks, Joseph L. *Entry to Undergraduate Flying Training*. (AFRL-HE-AZ-TP-1998-0077). Brooks Air Force Base, TX: Warfighter Training Research Division, United States Air Force Research Laboratory, August 1998.
- Weeks, Joseph L. *USAF Pilot Selection*. Proceedings of the Shepard Air Power Training Conference, British Aeronautical Society, London, United Kingdom, April 1998.